



# General Assembly

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**Committee on the Peaceful  
Uses of Outer Space**

**Report on the United Nations/International Astronautical  
Federation Workshop on Space Education and Capacity-  
Building for Sustainable Development**

**(Kitakyushu, Japan, 14 and 15 October 2005)**

**Contents**

	<i>Paragraphs</i>	<i>Page</i>
I. Introduction . . . . .	1-20	2
A. Background and objectives . . . . .	1-9	2
B. Programme . . . . .	10-16	3
C. Attendance and financial support . . . . .	17-20	4
II. On-site evaluation of the Workshop . . . . .	21-26	5
A. Responses received from participants . . . . .	22-24	5
B. Responses received from speakers . . . . .	25-26	5
III. Observations and recommendations . . . . .	27-40	6
A. Observations of the working groups . . . . .	27-36	6
B. Recommendations of the Workshop . . . . .	37-40	7
Annex. Pilot projects and best practices for introducing space into education . . . . .		10



## **I. Introduction**

### **A. Background and objectives**

1. The Third United Nations Conference on the Exploration and Peaceful Uses of Outer Space (UNISPACE III), in particular through its resolution entitled “The Space Millennium: Vienna Declaration on Space and Human Development”,<sup>1</sup> recommended that activities of the United Nations Programme on Space Applications should promote collaborative participation among Member States at the regional and international levels, emphasizing the development of knowledge and skills in developing countries.<sup>2</sup>
2. At its forty-seventh session, in 2004, the Committee on the Peaceful Uses of Outer Space endorsed the programme of workshops, training courses, symposiums and conferences planned for 2005.<sup>3</sup> Subsequently, the General Assembly, in its resolution 59/116 of 10 December 2004, endorsed the United Nations Programme on Space Applications for 2005.
3. Pursuant to General Assembly resolution 59/116 and in accordance with the recommendations of UNISPACE III, the United Nations/International Astronautical Federation Workshop on Space Education and Capacity-Building for Sustainable Development was held in Kitakyushu, Japan, on 14 and 15 October 2005, in conjunction with and as an associated event of the 56th International Astronautical Congress, which was held in Fukuoka, Japan, from 17 to 21 October 2005.
4. The Workshop was organized by the Office for Outer Space Affairs of the Secretariat, as part of the activities of the United Nations Programme on Space Applications in 2005, and the International Astronautical Federation (IAF). It was co-sponsored by the European Space Agency (ESA), the Ministry of Education, Culture, Sports, Science and Technology of Japan (MEXT), the Japan Aerospace Exploration Agency (JAXA), the City of Kitakyushu and the United Nations Educational, Scientific and Cultural Organization (UNESCO).
5. The Workshop was the fifteenth workshop organized jointly by the Office for Outer Space Affairs and IAF. It built upon the recommendations and experience gained from the previous 14 workshops, held between 1991 and 2004.
6. UNISPACE III agreed that enhancing education and training opportunities and ensuring public awareness of the importance of space activities was a fundamental requirement. While the potential benefits of space science and technology and their applications for developing countries were generally recognized, experience had shown that successful implementation and operational use of the technology was subject to the resolution of some major issues, including the continuous development of human resources. In that context, UNISPACE III attached great importance to enhancing capacity-building through the development of human and budgetary resources; the training and professional development of teachers; the exchange of teaching methods, materials and experience; and the development of infrastructure and policy regulations.
7. As a follow-up to the recommendations of UNISPACE III, the Action Team on Capacity-Building (recommendation 17) was established by the Committee on the Peaceful Uses of Outer Space to investigate mechanisms required for enhancing

capacity-building in space-related activities. The Action Team concluded its initial three-year workplan in 2004 and put forward a plan of action.

8. The Workshop addressed the issues referred to above and discussed how space education could contribute to sustainable development programmes in developing countries. The main objectives of the Workshop were: (a) to increase awareness among decision makers and the general public of the importance of space activities for improving the quality of life in developing countries; (b) to strengthen international and regional cooperation in those subjects; and (c) to develop a set of recommendations that could guide the implementation of recommendations put forward by UNISPACE III and the Action Team on Capacity-Building. The Workshop also provided a forum for discussion between space experts, policy and decision makers and representatives of the academic community and private industry from both developing and industrialized countries. All participants were encouraged to share their experiences and to examine opportunities for better cooperation.

9. The present report describes the background and objectives of the Workshop and provides a summary of the observations and recommendations of the participants. It has been prepared for submission to the Committee on the Peaceful Uses of Outer Space at its forty-ninth session and to its Scientific and Technical Subcommittee at its forty-third session, both to be held in 2006.

## **B. Programme**

10. The programme of the Workshop was developed jointly by the Office for Outer Space Affairs and the programme committee of the Workshop, which included highly regarded and experienced representatives of a number of national space agencies, international organizations and academic institutions. A substantial contribution was made by the honorary committee of the Workshop, which consisted of prominent representatives of IAF, JAXA and participating United Nations entities. The input received from both the honorary committee and the programme committee, as well as direct participation from members of those committees in the Workshop, ensured that the aims of the Workshop were achieved.

11. The programme of the Workshop focused on space education and enhancing capacity-building in developing countries through developing human resources at various levels, increasing public awareness and developing infrastructure in this area.

12. The programme included four technical sessions on: (a) promoting space education for primary and secondary school students; (b) providing education and training for space scientists and engineers for space activities in the coming years; (c) enhancing public awareness and increasing support for space activities; and (d) strengthening the international framework to support global and regional initiatives to enhance space education and capacity-building. Four working groups were established to develop the recommendations of the Workshop.

13. A total of 31 oral technical presentations were delivered during the two days of the Workshop and 12 papers were presented at the poster session. These focused on national, regional and international educational initiatives and the role of space

education and capacity-building for sustainable development programmes in developing countries.

14. Opening statements were delivered by representatives of the City of Kitakyushu, ESA, IAF, UNESCO and the Office for Outer Space Affairs. At the opening session, keynote addresses were made by U. R. Rao (IAF) on the topic of “Space science and technology for capacity-building and sustainable development” and Y. Matogawa (JAXA) on “Sparkling new interest in children’s minds: space activities for our next generations”. Closing remarks were made by representatives of MEXT, IAF, UNESCO, the Office for Outer Space Affairs and the local organizing committee for the 57th International Astronautical Congress, to be held in Spain in 2006.

15. Each of the technical sessions was followed by open discussions, which focused on specific topics of interest and provided additional opportunities for participants to voice their opinions. The discussions were continued in-depth and summarized by four working groups established by the participants to develop a set of recommendations that could promote space education and capacity-building in developing countries and contribute to international and regional cooperation. The results of the deliberations of the working groups were summarized and presented at the closing session, when a final discussion was held and the conclusions and recommendations resulting from the Workshop were adopted.

16. A detailed programme of the Workshop and its proceedings, together with the list of participants, are available on the website of the Office for Outer Space Affairs ([www.unoosa.org](http://www.unoosa.org)).

### **C. Attendance and financial support**

17. The United Nations, on behalf of the co-sponsors, invited developing countries to nominate candidates to participate in the Workshop. Participants were required to have a university degree or well-established professional working experience in a field related to the overall theme of the Workshop. In addition, participants were selected on the basis of their work experience in programmes, projects or enterprises that were already using space technology applications or that could potentially benefit from using space technology. The participation of specialists at the decision-making level from both national and international entities was particularly encouraged.

18. Funds allocated by the United Nations, IAF and ESA for the organization of the Workshop were used to provide financial support for the participation of 27 participants from developing countries and countries with economies in transition. Full financial support was received by 20 participants, which included international round trip air travel, hotel accommodation, living allowance for the duration of the Workshop and the International Astronautical Congress and registration fees for the Congress. Seven participants received partial funding (air travel or hotel and living allowance or Congress registration). The 27 participants came from 21 countries. The co-sponsors also covered the cost of registration fees for 25 participants from developing countries to attend the 56th Congress, held immediately after the Workshop.

19. The local organizing committee, which included representatives from MEXT, JAXA and the City of Kitakyushu, provided conference facilities, secretarial and technical support and local transportation to and from the airport for funded participants, and organized a number of social events for all Workshop participants.

20. The Workshop was attended by a total of 75 participants from the following 35 countries: Afghanistan, Australia, Brazil, Canada, China, Colombia, Czech Republic, Ecuador, Germany, India, Indonesia, Iraq, Japan, Kazakhstan, Kenya, Lao People's Democratic Republic, Malaysia, Mexico, Mongolia, Morocco, Mozambique, Netherlands, Nigeria, Philippines, Republic of Korea, South Africa, Spain, Sri Lanka, Thailand, United Kingdom of Great Britain and Northern Ireland, United States of America, Uzbekistan, Venezuela (Bolivarian Republic of), Viet Nam and Zimbabwe. The following regional and international organizations and other entities were also represented at the Workshop: ESA, IAF, the International Academy of Astronautics, the Space Generation Advisory Council (SGAC), UNESCO and the Office for Outer Space Affairs.

## **II. On-site evaluation of the Workshop**

21. On the second day of the Workshop, the organizers conducted a questionnaire survey of both funded participants and invited speakers. A total of 35 completed questionnaires (23 from participants and 12 from speakers) were submitted to the organizers. Some of the results of the survey are presented briefly below.

### **A. Responses received from participants**

22. All respondents among the participants (100 per cent) felt that the theme of the Workshop was relevant to their current work. The programme of the Workshop met the professional needs and expectations to a "very large extent" of 48 per cent and a "large extent" of 52 per cent of the respondents. The overall level of presentations at the Workshop was "very good" according to 57 per cent of respondents, while 43 per cent believed the level to be "good".

23. The responses indicated that 87 per cent of respondents felt that the overall organization of the workshop was "very good" and 13 per cent categorized it as "good".

24. The survey also showed that only 17 per cent of participants would have been able to attend the Workshop and the International Astronautical Congress without financial support provided by the organizers, while 83 per cent would not have been able to participate in these events without such support.

### **B. Responses received from speakers**

25. A total of 67 per cent of respondents among the speakers felt that the theme of the Workshop was relevant to the present state-of-the-art and application needs of space, while 42 per cent believed that the programme of the Workshop was structured in a way that allowed all aspects of space education and capacity-building to be conveyed to a "very large extent"; 50 per cent felt this to be to a "large

extent". The overall level and quality of participants at the Workshop was felt to be "very good" (33 per cent of the respondents) or "good" (67 per cent of the respondents).

26. The overall organization and logistics of the Workshop was considered to be "very good" in 58 per cent of the replies, "good" in 34 per cent of the replies. One response found this to be "not so good". In serving the goals of the United Nations and IAF to reach out and spread awareness on space technology and applications, the Workshop was "extremely useful" in the opinion of 58 per cent of the respondents and "quite useful" in the opinion of 42 per cent of the respondents.

### **III. Observations and recommendations**

#### **A. Observations of the working groups**

27. Workshop participants recognized that space activity inspired the young, stimulated their curiosity and motivated them to explore ideas, care about a sustainable world and increase their knowledge. Over time, the development of such interest in young people would lead to positive evolution of societies.

28. Space activity, because of its long-term development and application cycle, provided opportunities for all nations to participate in a sustained way and in concert with the activities of other nations.

29. Space activity was extraordinarily demanding and required the best minds, training and practices at all levels, including at the graduate level and beyond, for its successful sustained pursuit.

30. The participants noted that the global space community and space interest groups had long recognized the importance of the above three findings and consequently had made significant efforts to disseminate data and information derived from space and about space to the worldwide community and particularly to the educational institutions in their countries.

31. The United Nations and IAF recognized the importance of space education and capacity-building to achieving a sustainable world and each had specific activities under way to advance those areas through conferences, workshops and specific projects. Examples were the still-relevant recommendations adopted at the United Nations/International Astronautical Federation Workshop on Education and Capacity-Building in Space Technology for the Benefit of Developing Countries, with an Emphasis on Remote Sensing, held in Bremen, Germany, from 25 to 27 September 2003; the UNESCO/International Space University/International Astronautics Federation/International Academy of Astronautics Expert Workshop on Bridging Space and Education, held in Paris in March 2003; the findings and recommendations of the Action Team on Capacity-Building (which were adopted by the General Assembly in 2004) as the follow-up to UNISPACE III; and the activities of the IAF Space Education and Outreach Committee.

32. Despite such efforts, a remaining and significant impediment to the widespread implementation of education about space and using information derived from space was the lack of an adequate delivery system in schools, starting at the level of teachers, but even more importantly at the level of government authorities

responsible for establishing curricula. There was a lack of curricula in the formal and informal education systems of the world for the school age population either about space or which used information derived from space.

33. The Workshop noted a need for more coordination on education and capacity development at the international, regional, national and local levels.

34. The Workshop noted a lack of both an established comprehensive space databank and a depository of information on best practices regarding education, developed to a common standard that was internationally available.

35. The Workshop noted that the sources of funding to develop fully the education capacity of space assets still needed to be identified and committed.

36. The Workshop noted that interest by new entrants to universities and the workforce in pursuing space opportunities depended critically on their perception of sustained opportunities for a career in the field.

## **B. Recommendations of the Workshop**

37. Taking into account the above observations, the Workshop developed the following overall recommendations to be pursued by workshop participants and, where appropriate, by their organizations and other organizations that could help to implement the recommendations:

### **1. Partnership and organization**

38. The Workshop recommended that the following actions should be taken to promote partnership and organization:

(a) Encourage responsible space entities to work together on space education and thereby encourage, using, among other mechanisms, the regional centres for space science and technology education affiliated to the United Nations, the further development and the worldwide dissemination of information about space and information derived from space. Good examples of such initiatives are the International Space Education Board established by the Canadian Space Agency, ESA, JAXA and the National Aeronautics and Space Administration of the United States of America; the Asia-Pacific Regional Space Agency Forum; the Space Conferences of the Americas; the Global Learning and Observations to Benefit the Environment (GLOBE) programme; the programmes of the Space Foundation; the Universities Space Research Association; the Eduspace programme of ESA; the remote sensing education programme of the National Institute for Space Research of Brazil; and the Sharing of Experience in Space (SHARES) programme of the Indian Space Research Organization (ISRO);

(b) Encourage responsible space entities to work with local, national and regional education authorities to better coordinate and make use of space-based information systems to enhance the education experience of young people at all levels of schooling;

(c) Encourage the United Nations and its specialized agencies to continue their efforts to enhance global space education and capacity development and to participate in promoting, among their constituencies, space information

dissemination and international cooperating mechanisms, especially in countries without a developed capacity in space activity;

(d) Encourage greater coordination, scope and multinational participation for and among the regional centres for space science and technology education affiliated to the United Nations;

(e) Design and undertake outreach programmes, encouraging participation by educators and authorities in promoting the inclusion of space education into the education system;

(f) Engage young graduates in the space sector to participate in sharing their knowledge with the next generation;

(g) Encourage worldwide participation and growth in World Space Week events.

## **2. Education and resources**

39. The Workshop recommended that the following actions should be taken to promote education and resources:

(a) Suggest that Workshop participants work with appropriate organizations to urge their national authorities to establish specific mechanisms and processes for bringing space and all of its benefits for society into national education systems and develop and implement specific plans to engage the space community to assist in bringing this to reality;

(b) Suggest that Workshop participants work with the Office for Outer Space Affairs to establish a plan and point(s) of responsibility for creating a database of best practices for training educators and introducing space into the education system;

(c) Suggest that Workshop participants work with the Office for Outer Space Affairs to establish a plan and point(s) of responsibility for creating, maintaining and distributing free space information for education purposes in their regions;

(d) Encourage appropriate entities to develop pilot schemes for introducing space into education more widely both at the formal and informal levels. As examples of these, the annex to the present report lists a number of successful pilot projects and best practices presented at the Workshop;

(e) Encourage the development of the infrastructure necessary to undertake effective tele-education wherever it is needed in the world;

(f) Identify and pursue mechanisms to encourage public-private partnerships in supporting space education;

(g) Urge the regional centres for space science and technology education affiliated to the United Nations, in coordination with the Office for Outer Space Affairs, to synergize and harmonize their regional education efforts, such as materials, methods, tools, projects, faculty sharing, etc., to generate a well-integrated education programme.

### 3. Capacity-building

40. The Workshop recommended that the following actions should be taken to promote capacity-building:

(a) Encourage capacity-building in developing countries to participate in space activities;

(b) Increase the effectiveness of capacity-building by addressing national priorities and by focusing on the real-world application of the relevant space technology data and know-how;

(c) Encourage the United Nations and its specialized agencies to collaborate with local organizations in the development of curricula for space education and training that is applicable to regional, national and local levels;

(d) Organize advanced courses on space technologies and their applications through the regional centres for space science and technology education affiliated to the United Nations or through local universities in cooperation with regional initiatives. In order for the courses to be more widely available to local practitioners, the regional centres should make efforts to establish better links with universities or technical institutes in the region to offer such courses. The training could furthermore be supported by electronic learning (e-learning) technologies;

(e) Suggest that Workshop participants work with the proper national authorities to bridge the digital divide within developing countries for e-learning purposes, where appropriate, using space-based services;

(f) Stimulate extensive media coverage, using such outreach events as presented at the Workshop, to increase public support, and hence government support, effectively.

#### Notes

<sup>1</sup> *Report of the Third United Nations Conference on the Exploration and Peaceful Uses of Outer Space, Vienna, 19-30 July 1999* (United Nations publication, Sales No. E.00.I.3), chap. I, resolution 1.

<sup>2</sup> *Ibid.*, chap. II, para. 409 (d) (i).

<sup>3</sup> *Official Records of the General Assembly, Fifty-ninth Session, Supplement No. 20 and corrigenda (A/59/20 and Corr.1 and 2)*, para. 71.

## Annex

### **Pilot projects and best practices for introducing space into education**

The examples shown below of pilot projects and best practices for introducing space into education were presented at the United Nations/International Astronautical Federation Workshop on Space Education and Capacity-Building for Sustainable Development, held at Kitakyushu, Japan, on 14 and 15 October 2005.

1. The 2003 model rocket firing in Germany and 2005 regional water rocket launching contest in Japan are good examples of promoting space education and raising public awareness by reaching students on a large scale and attracting media coverage.
2. The regional centres for space science and technology education affiliated to the United Nations have been effectively providing postgraduate level courses to their regions. The courses are in remote sensing and geographic information systems; satellite communications; satellite meteorology; and space sciences. The education involves both classroom learning and project initiation. As an example, the regional centre in India is celebrating its tenth anniversary in 2005. That centre alone in the past 10 years has educated around 360 students in the Asia-Pacific region and 26 outside that region. A total of 46 countries in the Asia-Pacific region have benefited from the education. In addition to the classroom learning, about 350 projects for space applications have been initiated.
3. Space education missions to targeted countries may stimulate the national interest in sustainable space education programmes. UNESCO organized workshops in the Philippines and Nigeria in 2004 and 2005, respectively, and plans to organize more in the future. The workshops were supported by various space organizations through providing space science and technology experts to conduct the workshop activities.
4. Space information dissemination should be demand-driven to ensure the information is desired and hence will be used. A good example is the distribution of satellite images to African users by the Office for Outer Space Affairs. Three decades of Land Remote Sensing Satellite (LANDSAT) data (for the 1970s, 1990s and the current decade) were donated by the United States National Aeronautics and Space Administration to the Office for Outer Space Affairs for distribution to African users upon request. That project has received favourable feedback and is in high demand.
5. Regional workshops, conferences and symposiums can be essential in leveraging the combined expertise and capacities in a region. The United Nations Programme on Space Applications has been co-organizing such activities with host countries in Africa, Asia and the Pacific and Latin America and the Caribbean annually. Periodic evaluations were performed to assess the effectiveness of the activities for future improvement.
6. Dedicated educational satellite systems can be a very effective tool in tele-education. Several countries have already implemented this approach successfully.

7. Small satellite programmes that are being conducted within developing countries are showing a promise of generating significant interest within tertiary institutes.
  8. Information packages on the geography of Latin America, which are disseminated via CD-ROM, are an excellent mechanism for providing primary and secondary schools with information on how space technology can be used for a better life and a better knowledge of the environment.
  9. The educational materials and teaching aids provided by several educational organizations are an excellent source of material for others to use. The Global Learning and Observations to Benefit the Environment (GLOBE) programme, the programmes of the Space Foundation, the Universities Space Research Association, the Eduspace programme of the European Space Agency, the remote sensing education programme of the National Institute for Space Research of Brazil and the Sharing of Experience in Space (SHARES) programme of the Indian Space Research Organization have been providing materials to students globally to enrich space education. In addition, the Space Foundation has a database of space lesson plans.
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